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| EXAMINER | |
|---|---|
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Please find below and/or attached an Office communication concerning this application or proceeding.

| **Office Action Summary** | **Application No.** 09/681,534 | **Applicant(s)** FUNAKOSHI ET AL. | |
|---|---|---|---|
| | **Examiner** Leonid Shapiro | **Art Unit** 2673 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on *25 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5,6,8-10,12-14 and 16* is/are rejected.

7)☒ Claim(s) *4, 7, 11, 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-3, 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tjandrasuwita (US Patent No. 6,198,469 B1) in view of Kim (US Patent No. 5,859,633) and Asprey (US Patent No. 5,576,723).

As to claim 1, Tjandrasuwita teaches a liquid crystal apparatus (See Fig. 1, items 100, LCD DISPLAY, Col. 4,Lines 9-18) for displaying an image on a liquid crystal cell (See Col. 1, Lines 9-13) through a liquid crystal driver (See Fig. 1, item 100, Col. 4, Lines 9-18) driven by a predetermined number of bits (4 in the reference) (See col. 7, Lines 26-38) by inputting image data in which one pixel is presented with a plurality of subpixels (plurality is equivalent to RGB in the reference) (See Fig. 4, items 401-406, in description See Col. 7, Lines 26-38); memory for storing information about an offset for converting gray level coordinates (See Fig. 4, items 402- 404, in description See Col.3, Lines 65-68, Col. 4, Lines 1-2, Col. 7, Lines 20-25 and Col. 10, Lines 9-43); a gray level adjustment portion for performing a calculation on particular input sub-pixel data based on information about offset stored in memory (See Fig. 6- Fig. 9, Items 601-602, 604, in description See Col. 12, Lines 43-57); a pseudo-gray level-expansion portion for applying pseudo gray level expansion to sub-pixel data calculated by gray level adjustment portion, wherein sub-pixel data to which the pseudo gray level expansion

portion is supplied to liquid crystal driver to display the image on liquid crystal cell, whereby the number of gray scale levels which can be displayed is increased (See Fig. 1-2, 6, 10, items 603, 401, 301, 207-208, 113, 107, in description See Col. 4, Lines 63-68 and Col. 5, Lines 1-10).

Tjandrasuwita does not show how gray level coordinates of a gamma characteristic spaced evenly according to number of bits into gray level spaced unevenly.

Kim teaches gray level coordinates of a gamma characteristic spaced evenly according to number of bits into gray level spaced unevenly (See Fig. 3, 6, items Vo-V64, in description See Col. 2, Lines 4-29 and Col. 4, Lines 61-68).

It would be obvious to one of ordinary skill in the art at the time of invention to use Kim approach for extending gray scale capability in the Tjandrasuwita apparatus in order to provide gamma corrected gray scale voltages (See Col. 2, Lines 36-40 in the Kim reference) with increased number of gray levels in a LCD.

Tjandrasuwita and Kim do not show gray level coordinates of at least one sub-pixel are spaced at a higher density between the gray level coordinates of another sub-pixel.

Asprey teaches gray level coordinates of at least one sub-pixel are spaced at a higher density between the gray level coordinates of another sub-pixel (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full-scale divided by the same number of gradation will produce different density of gray levels, higher for blue compare to green. Combined monochrome video signal produced an optimum

shade of gray on the monitor for each of the red, green, and blue video signals, (directed to correspondent subpixels). A green component (correspondent to subpixel) appears as discrete shade of gray and different color with the same intensity (correspondent to different subpixel) will appear as different shade of gray having optimum contrast.

It would be obvious to one of ordinary skill in the art at the time of invention to use Asprey approach for increased number of gray levels in the Tjandrasuwita and Kim apparatus in order to convert color VGA to monochrome gray scale video signal (See Col. 3, Lines 17-21 in the Asprey reference).

As to claim 2, Tjandrasuwita teaches the memory stores as a look-up table an offset value to be added or subtracted from each gray level as a desired gamma characteristic for each sub-pixel to which gamma characteristic conversion is to be applied (See Fig. 4, items 402- 404, in description See Col.3, Lines 65-68, Col. 4, Lines 1-2, Col. 7, Lines 20-25 and Col. 10, Lines 9-43).

As to claims 3, Tjandrasuwita teaches an offset value is value represented with a higher density gray level using a larger number of bits than number of bits of liquid crystal driver (See Fig. 4, items 204,403, in description See Lines 26-59, including Table 1).

As to claim 8, Tjandrasuwita teaches a controller (See Fig. 1, Item 100, Col. 4, Lines 913) providing image data for each of plurality of subpixels (See Fig. 4, items 401-406, Col. 7, Lines 26-30) to a liquid crystal driver supplying voltage to a liquid crystal cell (See Col. 1, Lines 9-13) by inputting image data in which one pixel is presented with a

plurality of subpixels (plurality is equivalent to RGB in reference) (See Fig. 4, items 401-406, Col. 7, Lines 26-38); memory for storing information about an offset for converting gray level coordinates (See Fig. 4, items 402- 404, in description See Col.3, Lines 65-68, Col. 4, Lines 1-2, Col. 7, Lines 20-25 and Col. 10, Lines 9-43); a gray level adjustment portion for performing a calculation on particular input sub-pixel data based on information about offset stored in memory (See Fig. 6- Fig. 9, Items 601-602, 604, in description See Col. 12, Lines 43-57); a pseudo-gray level-expansion portion for applying pseudo gray level expansion to sub-pixel data calculated by gray level adjustment portion (See Fig. 1-2, 6, 10, items 603, 401, 301, 207-208, 113, 107, in description See Col. 4, Lines 63-68 and Col. 5, Lines 1-10).

Tjandrasuwita does not show how gray level coordinates of a gamma characteristic spaced evenly according to number of bits into gray level spaced unevenly.

Kim teaches gray level coordinates of a gamma characteristic spaced evenly according to number of bits into gray level spaced unevenly (See Fig. 3, 6, items Vo-V64, in description See Col. 2, Lines 4-29 and Col. 4, Lines 61-68) with increased number of gray levels.

It would be obvious to one of ordinary skill in the art at the time of invention to use Kim approach for extending gray scale capability in the Tjandrasuwita apparatus in order to provide gamma corrected gray scale voltages (See Col. 2, Lines 36-40 in the Kim reference) with increased number of gray levels in a LCD.

Tjandrasuwita and Kim do not show gray level representing additional levels to be displayed at higher density.

Asprey teaches gray level representing additional levels to be displayed by combining monochrome video signal which produces an optimum shade of gray for each combination of R, G and B signals produce a discrete shade of gray different of background shade of gray (See Fig. 1, items 18, 26, 30, in description See Col. 4, Lines 45-56) and a density of gray levels for at least one sub-pixel is greater than that of another sub-pixel (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full-scale divided by the same number of gradation will produce different density of gray levels, higher for red and blue compare to green. A green component (correspondent to subpixel) will appear as discrete shade of gray and different color with the same intensity (correspondent to different subpixel) will appear as different shade of gray having optimum contrast.

It would be obvious to one of ordinary skill in the art at the time of invention to use Asprey approach for increasing number of gray levels in the Tjandrasuwita and Kim apparatus in order to convert color VGA to monochrome gray scale video signal (See Col. 3, Lines 17-21 in the Asprey reference).

As to claim 16, Kim and Tjandrasuwita do not teach the same a brightness level of intermediate gray level.

Asprey teaches no multiple of a brightness levels by combining an optimum shade of gray for each combination of R, G and B signals which produce a discrete

shade of gray different of background shade of gray (See Fig. 1, items 18, 26, 30, in description See Col. 4, Lines 45-56).

It would be obvious to one of ordinary skill in the art at the time of invention to use Asprey approach for extending gray scale capability in the Tjandrasuwita and Kim apparatus in order to convert color VGA to monochrome gray scale video signal (See Col. 3, Lines 17-21 in the Asprey reference).

2. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tjandrasuwita in view of Asprey.

As to claim 5, Tjandrasuwita teaches a monochrome liquid crystal apparatus (See Fig. 2, items 113, LCD, Col. 5, Lines 4-10) with controller for outputting, from input monochrome data in which one pixel is represented with a plurality of sub-pixels (See fig. 2, item 201,Col. 5, Lines 11-23), a gray level set for each of plurality of sub-pixels; a liquid crystal cell for displaying a monochrome image (See Fig. 1, 2, 4, items 113, 201, 401-406, in description See Col. 5, Lines 1-47 and Col. 7, Lines 26-380; a liquid crystal driver for supplying a voltage to LC cell based on gray level of plurality of sub-pixels output from controller without varying the LC transmittance for a particular gray level among the plurality of subpixels (See Fig. 1-2, 6, 10, items 603, 401, 301, 207-208, 113, 107, in description See Col. 4, Lines 63-68 and Col. 5, Lines 1-10).

Tjandrasuwita does not show a characteristic for the particular subpixel in which no multiple of the brightness level of any intermediate gray level is identical to the brightness level of any intermediate gray level of another sub-pixel and selecting a gray

level which provides desired brightness from within characteristic and wherein a density of gray levels for at least one of sub-pixels is greater than that of another sub-pixel.

Asprey teaches that combined monochrome video signal produces an optimum shade of gray for each combination of R, G and B signals produce a discrete shade of gray different of background shade of gray (See Fig. 1, items 18, 26, 30, Col. 4, Lines 45-56) and a density of gray levels for at least one of sub-pixels Is greater than of a of another sub-pixel (full-scale green is 637 millivolt) (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full-scale divided by the same number of gradation will produce different density of gray levels, higher for red and blue compare to green. A green component (correspondent to subpixel) will appear as discrete shade of gray and different color with the same intensity (correspondent to different subpixel) will appear as different shade of gray having optimum contrast.

It would be obvious to one of ordinary skill in the art at the time of invention to use Asprey approach for increasing number of gray levels in the Tjandrasuwita apparatus in order to convert color VGA to monochrome gray scale video signal (See Col. 3, Lines 17-21 in the Asprey reference).

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tjandrasuwita and Asprey as aforementioned in claim 5 in view of Kim.

Tjandrasuwita and Asprey do not show controller uses a gray level which fills the space between coordinates of gray levels spaced evenly on a given gamma

characteristic curve to output gray level at plurality of sub-pixels or outputs a gray level based on a different gamma characteristic for the other subpixels.

Kim teaches gray level coordinates of a gamma characteristic spaced evenly according to number of bits into gray level spaced unevenly (See Fig. 3, 6, items Vo-V64, in description See Col. 2, Lines 4-29 and Col. 4, Lines 61-68).

It would be obvious to one of ordinary skill in the art at the time of invention to use Kim approach for a gray level which fills the space between coordinates of gray levels spaced evenly on a given gamma characteristic curve to output gray level at plurality of sub-pixels or outputs a gray level based on a different gamma characteristic for the other subpixels in the Tjandrasuwita and Asprey apparatus in order to provide "gamma correction" (See Col. 2, Line 29 in the Kim reference).

4. Claims 9-10, 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tjandrasuwita in view of Larkin et al. (US Patent No. 6,466, 225 B1) and Asprey.

As to claim 9, Tjandrasuwita teaches an image conversion method for displaying an image on a liquid crystal cell by supplying a voltage through a liquid crystal driver based on input image data (See Fig. 4, items 401-406, in description See Col. 7, Lines 26-38); inputting sub-pixel data in which one pixel of image data represented by plurality of sub-pixels (See Fig. 4, items 402- 404, in description See Col.3, Lines 65-68, Col. 4, Lines 1-2, Col. 7, Lines 20-25 and Col. 10, Lines 9-43); replacing sub-pixel data with an appropriate gray level which provides a desired brightness selected from a

higher density gray levels than a gray level with the number of bits in liquid crystal driver (See Fig. 6- Fig. 9, Items 601-602, 604, in description See Col. 12, Lines 43-57).

Tjandrasuwita does not show different gamma characteristics to each of plurality of sub-pixels.

Larkin et al. teaches different gamma characteristics to each of plurality of two sub-pixels (See Fig. 12, items LUT2-3, in description See Col. 6, Lines 13-15 and Lines 38-51).

It would be obvious to one of ordinary skill in the art at the time of invention to use Larkin et al. approach for different gamma and LUTs in the Tjandrasuwita apparatus in order to reduce number of artifacts (See Col. 1, Lines 27-32 in the Larkin et al. reference).

Larkin et al. and Tjandrasuwita do not teach to increase the number of intensity levels displayed.

Asprey teaches to increase the number of intensity levels displayed by combining an optimum shade of gray for each combination of R, G and B signals which produce a discrete shade of gray different of background shade of gray (See Fig. 1, items 18, 26, 30, in description See Col. 4, Lines 45-56). A green component (correspondent to subpixel) will appear as discrete shade of gray and different color with the same intensity (correspondent to different subpixel) will appear as different shade of gray having optimum contrast.

It would be obvious to one of ordinary skill in the art at the time of invention to use Asprey approach for increasing number of gray levels in the Tjandrasuwita and

Larkin et al. apparatus in order to convert color VGA to monochrome gray scale video signal (See Col. 3, Lines 17-21 in the Asprey reference).

As to claim 10, Tjandrasuwita teaches the step of pseudo-converting sub-pixel data replaced with appropriate gray level into data having the number of bits of LC driver (See Fig. 4, items 204, 403, in description See Col. 7, lines 26-59, including Table 1).

As to claim 12, Tjandrasuwita teaches inputting of a plurality pieces of sub-pixel, each of pieces of sub-pixel image data comprising N bits (See Fig. 4, items 402-404, in description See Col.3, Lines 65-68, Col. 4, Lines 1-2, Col. 7, Lines 20-25 and Col. 10, Lines 9-43); selecting an appropriate gray level which provides desired brightness, providing replaced gray level as an output value for particular piece of sub-pixel image (See Fig. 6- Fig. 9, Items 601-602, 604, in description See Col. 12, Lines 43-57).

Tjandrasuwita does not show second gamma characteristics corresponding to M bits (M>N), which is provided by adjusting a first gamma characteristic corresponding to N bits, selecting an appropriate gray level which provides desired brightness based on second gamma characteristic.

Larkin et al. teaches different gamma characteristics to each of plurality of two sub-pixels (See Fig. 12, items LUT2-3, in description See Col. 6, Lines 13-15 and Lines 38-51). It would be obvious to one of ordinary skill in the art at the time of invention to use Larkin et al. approach for different gamma and LUTs in the Tjandrasuwita

apparatus in order to reduce number of artifacts (See Col. 1, Lines 27-32 in the Larkin et al. reference).

Larkin et al. and Tjandrasuwita do not teach a portion of M bits representing gray levels at a higher density between gray levels represented by N bits.

Asprey teaches a portion of M bits representing gray levels between gray levels represented by N bits by combining an optimum shade of gray for each combination of R, G and B signals which produce a discrete shade of gray different of background shade of gray (See Fig. 1, items 18, 26, 30, in description See Col. 4, Lines 45-56) and a density of gray levels for at least one of sub-pixels (full-scale blue is 511 millivolt and 546 millivolt for red) isgreater than of a of another sub-pixel (full-scale green is 637 millivolt) (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full-scale divided by the same number of gradation will produce different density of gray levels, higher for red and blue compare to green. A green component (correspondent to subpixel) will appear as discrete shade of gray and different color with the same intensity (correspondent to different subpixel) will appear as different shade of gray having optimum contrast.

It would be obvious to one of ordinary skill in the art at the time of invention to use Asprey approach for increasing number of gray levels in the Tjandrasuwita and Larkin et al. apparatus in order to convert color VGA to monochrome gray scale video signal (See Col. 3, Lines 17-21 in the Asprey reference).

As to claim 13, Tjandrasuwita teaches a an image display method for displaying a monochrome image having multiple gray levels by dividing one pixel into multiple

subpixels (See Fig. 1, 2, 4, items 113, 201, 401-406, in description See Col. 5, Lines 1-47 and Col. 7, Lines 26-380; selecting an appropriate gray level providing desired brightness based on assumed gamma characteristic, displaying the monochrome image based on selected appropriate gray level (See Fig. 1-2, 6, 10, items 603, 401, 301, 207-208, 113, 107, in description See Col. 4, Lines 63-68 and Col. 5, Lines 1-10).

Tjandrasuwita does not assume a gamma characteristic of sub-pixels in which no multiple of a brightness level of a intermediate gray level of sub-pixel is identical to a brightness level of any intermediate gray level of another sub-pixel.

Larkin et al. teaches different gamma characteristics to each of plurality of two sub-pixels (See Fig. 12, items LUT2-3, in description See Col. 6, Lines 13-15 and Lines 38-51).

It would be obvious to one of ordinary skill in the art at the time of invention to use Larkin et al. approach for different gamma and LUTs in the Tjandrasuwita apparatus in order to reduce number of artifacts (See Col. 1, Lines 27-32 in the Larkin et al. reference).

Larkin et al. and Tjandrasuwita do not teach the same a brightness level of intermediate gray level and wherein a density of gray levels for at least one of sub-pixels is greater than that of another sub-pixel.

Asprey teaches no multiple of a brightness levels by combining an optimum shade of gray for each combination of R, G and B signals which produce a discrete shade of gray different of background shade of gray (See Fig. 1, items 18, 26, 30, in description See Col. 4, Lines 45-56) and a density of gray levels for at least one of sub-

pixels (511 millivolt for blue and 546 millivolt for red) is greater than that of another sub-pixel (637 millivolt for green) (See Fig. 1, items 18, 26, 30, Col. 4, Lines 31-39). A green component (correspondent to subpixel) will appear as discrete shade of gray and different color with the same intensity (correspondent to different subpixel) will appear as different shade of gray having optimum contrast.

It would be obvious to one of ordinary skill in the art at the time of invention to use Asprey approach for increasing number of gray levels in the Tjandrasuwita and Larkin et al. apparatus in order to convert color VGA to monochrome gray scale video signal (See Col. 3, Lines 17-21 in the Asprey reference).

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tjandrasuwita, Larkin et al. and Asprey as aforementioned in claims 9 and 13 in view of Kim.

Tjandrasuwita, Larkin et al. and Asprey do not show higher density gray levels between gray levels spaced evenly on basic gamma characteristic curve set based on the number of bits and replacing their original gray level with the selected gray level.

Kim teaches gray level coordinates of a gamma characteristic spaced evenly according to number of bits into gray level spaced unevenly (See Fig. 3, 6, items Vo-V64, in description See Col. 2, Lines 4-29 and Col. 4, Lines 61-68).

It would be obvious to one of ordinary skill in the art at the time of invention to use Kim approach filling the space between gray levels of a basic gamma characteristic

set based on number of bits the Tjandrasuwita and Larkin et al. apparatus in order to provide "gamma correction" (See Col. 2, Line 29 in the Kim reference).

### *Allowable Subject Matter*

6. Claims 4, 7, 11, 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Relative to claim 4, the major difference between the teaching of the prior art of record (Tjandrasuwita (US Patent No. 6,198,469 B1, Kim (US Patent No. 5,859,633) and Asprey (US Patent No. 5,576,723) and the instant invention is that the said prior art **does not teach** the pseudo-gray-level-expansion portion converts sub-pixel data which is converted by gray level adjustment portion and has a larger number of bits than number of bits of liquid crystal driver into data which has number of bits of liquid crystal driver and is equivalent to data having larger number of bits.

Relative to claim 7, the major difference between the teaching of the prior art of record (Tjandrasuwita (US Patent No. 6,198,469 B1, Kim (US Patent No. 5,859,633) and Asprey (US Patent No. 5,576,723) and the instant invention is that the said prior art **does not teach** the controller outputs a gray level by using the given gamma characteristic for particular sub-pixel of plurality of sub-pixels and outputs a gray level based on a different gamma characteristic for other sub-pixels.

Relative to claim 11, the major difference between the teaching of the prior art of record (Tjandrasuwita (US Patent No. 6,198,469 B1, Kim (US Patent No. 5,859,633)

and Asprey (US Patent No. 5,576,723) and the instant invention is that the said prior art **does not teach** replacing step replaces the sub-pixel data with an appropriate gray level by using a gray level filling the space between gray levels of a basic gamma characteristic set based on the number of bits.

Relative to claim 15, the major difference between the teaching of the prior art of record (Tjandrasuwita (US Patent No. 6,198,469 B1, Kim (US Patent No. 5,859,633) and Asprey (US Patent No. 5,576,723) and the instant invention is that the said prior art **does not teach** one of plurality of sub-pixels is displayed based on basic gamma characteristic and the other sub-pixels are displayed based on the gamma characteristic provided by selecting an appropriate gray level providing desired brightness from higher gray density gray levels and replacing their original gray level with selected gray level.

***Response to Amendments***

7. Applicant's arguments filed on 03.25.04 have been fully considered but they are not persuasive:

On page 11, last paragraph and page 12, 1st paragraph of Remarks in relation to claim 1, Applicant's stated neither Tiandrasuwita nor Kim nor Asprey teach or suggest that that the gray levels of at least one sub-pixel are spaced at higher density between the gray level coordinates of another sub-pixel. However, Asprey teaches that combined monochrome video signal produced an optimum shade of gray for each combination of R, G and B signals (See Fig. 1, items 18, 26, 30, Col. 4, Lines 45-60) and gray level coordinates of at least one sub-pixel are spaced at a higher density (511

millivolt for full scale blue video signal and 546 millivolt full scale red video signal) between the gray level coordinates of another sub-pixel (637 millivolt for full scale green video signal) (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full scale divided by the same number of gradation will produce different density of gray levels, higher for red and blue compare to green.

On page 12, last paragraph and page 13, 1st paragraph of Remarks in relation to claim 5, Applicant's stated neither Tiandrasuwita nor Kim nor Asprey teach or suggest that that a density of gray levels for at least one sub-pixels is greater than that of another of the sub-pixels. However, Asprey teaches that combined monochrome video signal produced an optimum shade of gray for each combination of R, G and B signals (See Fig. 1, items 18, 26, 30, Col. 4, Lines 45-60) and gray level coordinates of at least one sub-pixel are spaced at a higher density (511 millivolt for full scale blue video signal and 546 millivolt full scale red video signal) between the gray level coordinates of another sub-pixel (637 millivolt for full scale green video signal) (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full scale divided by the same number of gradation will produce higher density for red and blue compare to green.

On page 12, last paragraph and page 13, 1st paragraph of Remarks in relation to claim 5, Applicant's stated the Examiner completely misses the point that there is no teaching or suggestion in the cited references, that the number of gray scale levels that can be displayed will be greatly increased. However, Asprey teaches: "This combined monochrome video signal produces an optimum shade of gray on the monitor for each

of the red, green, and blue video signals and combinations thereof" (See Col. 4, Lines 45-48).

On page 15, first paragraph of Remarks in relation to claim 8, Applicant's stated that no prior art teach or suggest that that the gray levels of at least one sub-pixel are spaced at higher density between the gray level coordinates of another sub-pixel. However, Asprey teaches that combined monochrome video signal produced an optimum shade of gray for each combination of R, G and B signals (See Fig. 1, items 18, 26, 30, Col. 4, Lines 45-60) and gray level coordinates of at least one sub-pixel are spaced at a higher density (511 millivolt for full scale blue video signal and 546 millivolt full scale red video signal) between the gray level coordinates of another sub-pixel (637 millivolt for full scale green video signal) (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full scale divided by the same number of gradation will produce different density of gray levels, higher for red and blue compare to green.

On page 16, first paragraph of Remarks in relation to claim 9, Applicant's stated that the problem of differentiation from background of Asprey has nothing to do with increasing the number of intensity levels displayed. However, Claim 9 has a following limitation: "so as to increase the number of intensity levels displayed". Also, See Fig. 5a of Disclosure in relation to increased number of gray levels.

On page 16, last paragraph and page 17, first paragraph of Remarks in relation to claim 12, Applicant's stated no prior art teach or suggest that that the gray levels of at least one sub-pixel are spaced at higher density between the gray level coordinates of another sub-pixel. However, Asprey teaches that combined monochrome video signal

produced an optimum shade of gray for each combination of R, G and B signals (See Fig. 1, items 18, 26, 30, Col. 4, Lines 45-60) and gray level coordinates of at least one sub-pixel are spaced at a higher density (511 millivolt for full scale blue video signal and 546 millivolt full scale red video signal) between the gray level coordinates of another sub-pixel (637 millivolt for full scale green video signal) (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full scale divided by the same number of gradation will produce different density of gray levels, higher for red and blue compare to green.

On page 16, 2nd paragraph of Remarks in relation to claim 13, Applicant's stated that no prior art teach or suggest that that the gray levels of at least one sub-pixel are spaced at higher density between the gray level coordinates of another sub-pixel. However, Asprey teaches that combined monochrome video signal produced an optimum shade of gray for each combination of R, G and B signals (See Fig. 1, items 18, 26, 30, Col. 4, Lines 45-60) and gray level coordinates of at least one sub-pixel are spaced at a higher density (511 millivolt for full scale blue video signal and 546 millivolt full scale red video signal) between the gray level coordinates of another sub-pixel (637 millivolt for full scale green video signal) (See Fig. 1, items 18, 26, 30, Col. 4, Lines 26-56). Notice, that full scale divided by the same number of gradation will produce different density of gray levels, higher for red and blue compare to green.

***Telephone inquire***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonid Shapiro whose telephone number is 703-305-5661. The examiner can normally be reached on 8 a.m. to 5 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on 703-305-4938. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Ls 05-26-04

**VIJAY SHANKAR**
**PRIMARY EXAMINER**